Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Redesignation of the 17.7-19.7 GHz Frequency	)	
Band, Blanket Licensing of Satellite	)	IB Docket No. 98-172
Earth Stations in the 17.7-20.2 GHz and	)	RM-9005
27.5-30.0 GHz Frequency Bands,	)	RM-9118
and the Allocation of Additional Spectrum	)	
in the 17.3-17.8 GHz and 24.75-25.25 GHz	)	
Frequency Bands for Broadcast	)	
Satellite-Service Use	)	

REPORT AND ORDER

Adopted: June 8, 2000 Released: June 22, 2000

By the Commission: Commissioner Furchtgott-Roth approving in part, dissenting in part and issuing a statement.

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I. INTRODUCTION

1. With this *Report and Order*, we adopt rules that will permit the efficient use of spectrum for existing and future users, and will facilitate the deployment of new services in the 17.7-20.2 GHz band ("18 GHz band"). In particular, we adopt a band plan that designates how terrestrial fixed services, the Geostationary Satellite Orbit Fixed Satellite Service ("GSO/FSS"), the Non-Geostationary Satellite Orbit Fixed-Satellite Service ("NGSO/FSS"), and Mobile-Satellite Service feeder links ("MSS/FL") are to share this band. As a consequence of this designation, this *Report and Order* modifies the Table of Frequency Allocations found in Section 2.106 of the Commission's Rules.[1] This *Report and Order* also modifies service rules in the 18 GHz band and authorizes the blanket licensing of satellite earth stations in the bands where the Fixed Satellite Service ("FSS") is the sole primary designation. Finally, this *Report and Order* allocates the band 17.3-17.7 GHz to the Broadcasting-Satellite Service ("BSS") and the band 24.75-25.25 GHz to the FSS for BSS feeder links, as described below.

2. The 18 GHz band currently serves a variety of communications needs and has the potential to provide consumers, both business and residential, with exciting new services in the years to come. Our actions in this proceeding will allow for more efficient use of this spectrum. Previously, the entire 18 GHz band was allocated for shared use among various terrestrial fixed and mobile services, the FSS, and the mobile satellite service ("MSS").[2] We conclude that, in

[1] 47 C.F.R. § 2.106.

[2] *See* Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Service, *First Report and Order and Fourth Notice of Proposed Rulemaking*, CC Docket No. 92-297, 11 FCC Rcd 19005 (1996) (*28 GHz First Report and Order*). The *28 GHz First Report and Order* established a band plan for the Ka-band. The "Ka-band" refers to the space-to-

general, separating terrestrial fixed service operations from ubiquitously deployed FSS earth stations in dedicated sub-bands would serve the public interest. We also conclude, however, that limited frequency sharing between satellite and terrestrial services is feasible and should continue to be permitted where it serves the requirements of these services. We have attempted to protect the existing fixed terrestrial operations in this band to the maximum extent possible, while at the same time providing for the growth of both satellite and terrestrial services. This *Report and Order* should assist both the satellite and terrestrial services in the analysis of future growth possibilities by providing certainty as to how these services may share the 18 GHz band and thereby enabling the affected industries to make informed business decisions.

II. EXECUTIVE SUMMARY

3. The band plan we adopt today is a result of an examination of the record, developed in response to our *18 GHz NPRM* (or "*NPRM*").[3] We have considered the concerns expressed in the parties' comments and have fashioned our decisions to resolve those concerns in as equitable a manner as possible.

4. In the band plan we adopt today, we designate the following spectrum for **terrestrial fixed service use**: (1) 17.7-18.3 GHz band on a primary basis; (2) 18.3-18.58 GHz band on a co-primary basis (with GSO/FSS); and (3) 19.3-19.7 GHz band on a co-primary basis (with MSS/FL). We designate the following spectrum for **GSO/FSS service use**: (1) 18.58-18.8 GHz band on a primary basis; and (2) 18.3-18.58 GHz band on a co-primary basis(with terrestrial fixed service), noting that the 19.7-20.2 GHz band is also allocated on a primary basis to the GSO/FSS. Furthermore, we designate the 18.8-19.3 GHz band to **NGSO/FSS service use** on a primary basis, and retain co-primary status for **MSS/FL** (with terrestrial fixed service) in the 19.3-19.7 GHz band. These designations will significantly reduce sharing in the 18 GHz band, and thereby eliminate the need for many existing coordination procedures,[4] leading to lower transaction costs and more efficient use of the band. We note that United States Government systems are authorized to operate in the 17.8-20.2 GHz band in accordance with footnote US334 in the United States Table of Frequency Allocations and that coordination between non-Government operations, both terrestrial and satellite, and these Government operations will continue to remain in effect. Nothing in this *Report and Order* purports to change the relationship between Government and non-Government systems.[5]

Earth (downlink) frequencies at 17.7-20.2 GHz and the corresponding Earth-to-space (uplink) frequencies at 27.5-30.0 GHz (the "28 GHz band").

[3] *See* Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use, *Notice of Proposed Rulemaking*, IB Docket No. 98-172, 13 FCC Rcd 19923 (1998) (*18 GHz NPRM*).

[4] *Cf.* 47 C.F.R. §§ 25.203, 101.103(d)(discussing coordination procedures).

[5] *See* Amendment of Part 2 of the Commission's Rules to Allocate Spectrum for the Fixed-Satellite Service in the 17.8-20.2 GHz Band for Government Use, *Memorandum Opinion and Order*, 10 FCC Rcd 9931 (1995)..

5. Recognizing the importance of existing terrestrial fixed service systems in the 18 GHz band, we will permit terrestrial fixed stations currently operating in spectrum being designated in this *Report and Order* for exclusive satellite use to continue to operate on a co-primary basis for a period of ten years, subject to the overriding right of satellite providers to require terrestrial fixed stations to relocate. During this ten-year period, existing terrestrial fixed stations can be compelled to relocate in accordance with relocation procedures adopted herein. If a terrestrial fixed station is required to relocate within ten years of the effective date of this *Report and Order*, the satellite provider must pay to relocate the terrestrial fixed station to comparable facilities. At the end of the ten-year period, existing terrestrial fixed stations may continue to operate on a non-interference basis. In the case of 19.26-19.30 GHz, the co-primary status of existing terrestrial fixed stations, as well as their entitlement to relocation costs, is permanent.

6. This *Report and Order* also authorizes a blanket licensing regime for satellite earth stations for segments of the 17.7- 20.2 GHz and 27.5-30.0 GHz frequency bands—bands not subject to sharing with other services. Specifically, we will accept such applications for blanket licensing in the 18.58-18.8 GHz, 18.8-19.3 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz, 28.6-29.1 GHz, and 29.5-30.0 GHz frequency bands.[6] In all those bands designated as primary to the GSO/FSS, we adopt the specific technical conditions concerning space station and earth station performance recommended by the Blanket Licensing Industry Working Group to ensure that intra-system interference stays within acceptable levels. With respect to the blanket licensing of NGSO/FSS systems, we adopt an equation to determine the power-flux density (pfd) of space stations that, for low elevation angles, includes a consideration of the number of satellites in the NGSO system constellation, which was recommended by technical study groups of the Radiocommunications Sector of the International Telecommunication Union (ITU-R) for inclusion in the ITU's Radio Regulations. The blanket licensing regime adopted in this *Report and Order* describes the parameters within which earth stations may be operated under a blanket license, as well as the solutions for minimizing potential interference on both an intra- and inter-service basis.

7. This *Report and Order* also allocates 400 *MHz* of spectrum at 17.3-17.7 GHz for primary BSS uses, effective April 1, 2007, as specified in the ITU Radio Regulations. We allocate the 24.75-25.05 GHz band for primary GSO/FSS (Earth-to-space) use, limited to feeder links for the BSS in the 17.3-17.7 GHz band, and the GSO/FSS 25.05-25.25 GHz band for co-primary use between the FSS (Earth-to-space), limited to BSS feeder links, and the fixed service, comprised of the 24 GHz Service.[7]

[6] Existing Fixed Stations have, during the grandfathering period, a co-primary designation. This means that, as earth stations populate the satellite service area they must accept any interference received from these previously licensed stations, or pay for their relocation to another frequency (or an alternative media, such as fiber optics) with equivalent link performance..

[7] The 24 GHz Service in the 24 GHz band was formerly known as the Digital Electronic Messaging Service (DEMS).

III. BACKGROUND

8. In response to the *18 GHz NPRM*, we received numerous comments and reply comments from entities representing a broad cross-section of the communications industry.[8] The majority of the commenters recognized that sharing between terrestrial fixed service and satellite services in the 18 GHz band is not possible where satellite earth stations are ubiquitously deployed.[9] Thus, a majority of the commenters agreed with the Commission's tentative conclusion in the *18 GHz NPRM* that the public interest is best served by separating terrestrial fixed service operations from the operations of non-government ubiquitously deployed FSS earth stations into dedicated sub-bands.[10] Many of these same commenters, however, have requested that their respective services be designated a greater amount of spectrum than the spectrum allocated by this *Report and Order* today.

9. The 17.7-19.7 GHz frequency band is currently allocated for terrestrial fixed service, FSS downlinks (both Geostationary Orbit and Non-Geostationary Orbit), and for feeder links to the MSS.[11] In 1996, the Commission adopted a band designation plan for the 28 GHz band and the 18 GHz band to accommodate the needs of competing terrestrial fixed and satellite services.[12] In the *28 GHz First Report and Order*, the Commission concluded that "co-frequency sharing between either GSO/FSS or NGSO/FSS ubiquitously deployed terminals and LMDS (Local Multipoint Distribution Service) with its ubiquitously deployed subscriber terminals, is not feasible at this time."[13] As a result, the 28 GHz band plan eliminated co-frequency sharing

[8] A list of the commenters is provided in Appendix C.

[9] *See, e.g.*, Comments of the American Petroleum Institute at 6 ("Sharing spectrum with ubiquitously deployed satellite earth stations on a co-primary basis has proven unworkable in the past, and similar sharing in the 18 GHz band would result in further loss of spectrum for fixed services and exclusion of fixed services from large geographical areas") (API Comments); Comments of the Cellular Telecommunications Industry Association at 5-6 ("Unacceptable interference is likely to occur when microwave fixed services and satellite services operate in the same frequency bands") (CTIA Comments); Comments of the Fixed Point-to-Point Section of the Telecommunications Industry Association at app. A ("The Fixed Section does not believe it will be feasible for the FS and FSS to share the entire band, certainly not with blanket licensing of earth stations") (TIA-Fixed Section Comments).

[10] *See 18 GHz NPRM* at ¶ 1; *see also, e.g.*, Comments of SBC Communications, Inc. at 2 ("SBC agrees that sharing between these services is not possible and supports the separation of the services into discrete segments of [the] band") (SBC Comments); Comments of Winstar Communications, Inc. at 7 ("The Commission correctly recognized in its Notice that blanket-licensed, ubiquitously deployed earth station terminals and terrestrial fixed service facilities cannot share the same frequencies") (Winstar Comments).

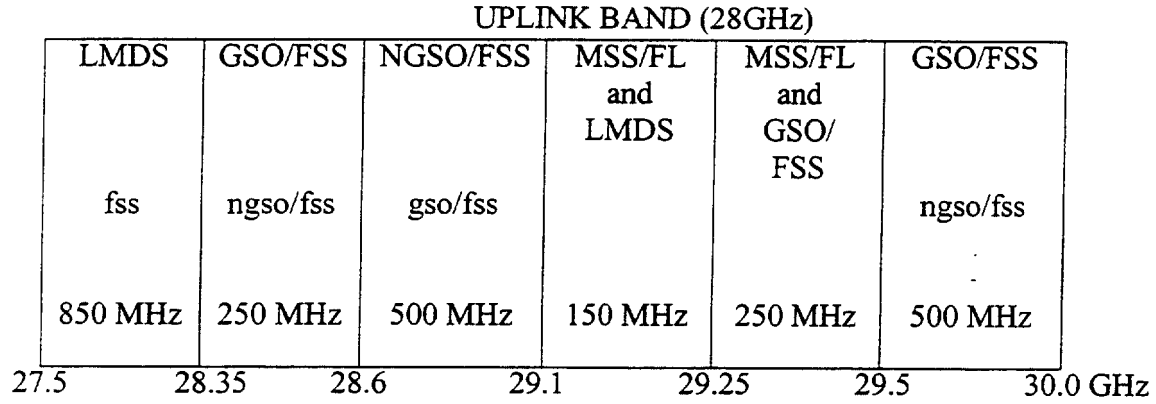
[11] *See* 47 C.F.R. § 2.106. It should be noted that United States Government systems are also authorized to operate in part of the 18 GHz band, specifically, in the 17.8-20.2 GHz band. *See id.* This *Report and Order*, however, concerns only non-Government operation in the 18 GHz band. Furthermore, the 18.6-18.8 GHz band is allocated for both Government and non-Government Earth Exploration Satellite (EES) (passive) and Space Research (SR) (passive). *See id.*

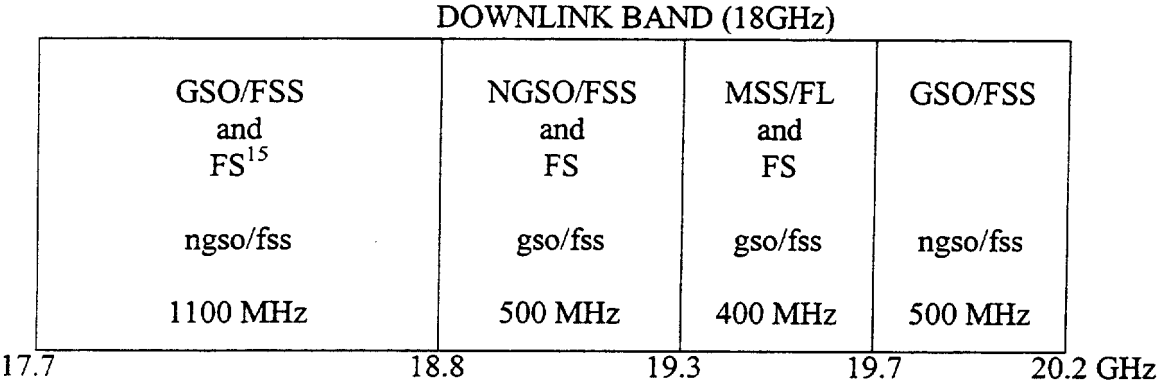
[12] *See 28 GHz First Report and Order*, *supra* note 1. Satellite uplinks in the 28 GHz band are paired with satellite downlinks in the 18 GHz band, which caused the Commission to act on both bands in the *28 GHz First Report and Order*.

[13] *Id.* ¶ 27, at 19015-16.

except for those segments where sharing was technically feasible. In addressing the 18 GHz band, however, the designation plan of the *28 GHz First Report and Order* mandated that terrestrial services and satellite services share segments of the band, though the Commission noted that the record demonstrates that such co-frequency sharing presents multiple challenges.

10. The band plan adopted in the *28 GHz First Report and Order* is as follows:[14]





As depicted above, prior to this rulemaking, the 18 GHz band was designated for use as follows: the 17.7-18.8 GHz band for co-primary use by GSO/FSS and terrestrial fixed service; the 18.8-19.3 GHz band for co-primary use by NGSO/FSS and terrestrial fixed service; the 19.3-19.7 GHz band for co-primary use by MSS/FL and terrestrial fixed service; and the 19.7-20.2 GHz band for primary use by GSO/FSS.

11. Since the adoption of the *28 GHz First Report and Order*, several factors have led us to conclude that co-frequency sharing between terrestrial fixed service and ubiquitously deployed

[14] *See id.* ¶¶ 42, 77, at 19024, 19036. Services designated for primary domestic licensing priority are specified by capital letters and services designated for secondary domestic licensing priority are specified by the use of lower case letters. We note that the *28 GHz First Report and Order* only adopted changes to Part 25 of the Commission's Rules, and did not modify the Allocation Table in Part 2, an action taken by this *Report and Order*.

[15] Terrestrial Fixed Service.

FSS earth stations in the 18 GHz band is generally infeasible. [16] For instance, we expect use of the 18 GHz band by both terrestrial fixed services and FSS systems to increase dramatically over the next few years. Currently there are approximately 179,000 terrestrial fixed links in the 18 GHz band. Use of the band is expected to increase as terrestrial fixed services migrate from congested lower bands and as 18 GHz band systems expand. Although there currently are no non-government[17] FSS systems in operation in the 18 GHz band, we have granted thirteen GSO/FSS licenses[18] and one NGSO/FSS license[19] to launch and operate Ka-band FSS systems in the near future. The expected increase in 18 GHz band use in the years to come, as well as the desire on the part of the FSS industry to implement blanket licensing of ubiquitously deployed satellite earth stations, led us to conclude in the *NPRM* that, under most circumstances, sharing between terrestrial fixed service and FSS operations will become increasingly difficult and is therefore not feasible on a going-forward basis.

12. In the *NPRM*, we tentatively concluded "that the public interest is best served by separating terrestrial fixed service operations from the operations of non-government ubiquitously deployed FSS earth stations into dedicated sub-bands."[20] To this end, the *NPRM* proposed four band redesignation plans.[21] We recognized that redesignation of the 18 GHz band may have an adverse effect on existing terrestrial fixed service systems currently operating in the band. To alleviate any adverse effects on existing systems, the *NPRM* proposed to "grandfather" licensed terrestrial operations in the band, along with applications that were pending as of September 18, 1998.[22] The *NPRM* asked for comments on the proposed redesignation plans and the "grandfathering" provision. We also requested comments on conditions under which relocation of existing terrestrial fixed systems may be necessary notwithstanding such proposed "grandfathering," and the terms of such relocation.[23]

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[16] In the limited instances where co-frequency sharing is required, the ubiquitous deployment of earth stations will not be permitted.

[17] Government FSS systems have been coordinated for several years. *See supra* note 5.

[18] *See* Authorizations of: Comm, Inc. (DA 97-968); GE American Communications, Inc. (DA 97-970); EchoStar Satellite Corporation (DA 97-969); Hughes Communications Galaxy, Inc. (DA 97-971); KaStar Satellite Communications Corp. (DA 97-972); Lockheed Martin Corporation (DA 97-973); Loral Space & Communications Ltd. (DA 97-974); Morning Star Satellite Company, L.L.C. (DA 97-975); NetSat 28 Company, L.L.C. (DA 97-976); Orion Atlantic, L.P. (DA 97-979); Orion Network Systems, Inc. (DA 97-977); PanAmSat Licensee Corp. (DA 97-978); and VisionStar, Inc. (DA 97-980) (International Bureau, May 9, 1997). The Commission also assigned the thirteen GSO/FSS licensees orbital locations. *See* Assignment of Orbital Locations to Space Station in the Ka-band, *Order*, 12 FCC Rcd 13737 (1997).

[19] *See* Application of Teledesic Corporation for Authority to Construct, Launch, and Operate a Low Earth Orbit Satellite System in the Domestic and International Fixed Satellite Service, *Order*, 12 FCC Rcd 3154 (1997).

[20] *18 GHz NPRM* ¶ 1.

[21] *See* redesignation discussion, *infra*.

[22] *See 18 GHz NPRM* ¶ 40. The "grandfather" provision proposed that satellite earth stations would be required to coordinate with grandfathered terrestrial fixed services, however, grandfathered systems would not be permitted to modify their operations "in any manner that might increase interference to satellite earth stations." *See id.*

[23] *See id.* ¶ 41.

13. In early November 1998, as a response to the cut-off date for the grandfathering proposed in the *18 GHz NPRM*, the Fixed Point-to-Point Communications Section, Wireless Communications Division of the Telecommunications Industry Association ("TIA-Fixed Section") and the Independent Cable & Telecommunications Association ("ICTA") filed petitions for relief from implementation of the September 18, 1998 "cut-off" date.[24] TIA-Fixed Section argued that the cut-off date proposed in the *NPRM* constituted a *de facto* freeze on further development of affected terrestrial fixed service in the 18 GHz band, while ICTA argued that private cable operators ("PCOs") would not be able to survive should the cut-off date be adopted.

14. On February 5, 1999, the Commission adopted an *Order (18 GHz Relief Order)* in response to the two petitions,[25] modifying our proposal so that the PCO applications in the 18.3-18.55 GHz band would be considered co-primary with the FSS if filed before the release of this *Report and Order*.[26] We did not, however, change the proposed cut-off date for other non-PCO terrestrial fixed operations in the 18.3-18.55 GHz band and 18.8-19.3 GHz band. The *18 GHz Relief Order* left the final determination regarding the cut-off date and grandfathered status for all terrestrial fixed services for resolution in this *Report and Order*.[27]

15. In the *18 GHz NPRM*, we proposed to implement a blanket licensing procedure that would allow Ka-band FSS earth stations to operate under a single system license in bands that are designated for their primary use. The Commission tentatively concluded that such a blanket licensing procedure would provide an efficient means for licensing the vast number of small antenna FSS earth stations expected to be deployed in the Ka-band.[28] We also proposed that blanket license applicants be required to designate a point of contact to provide secondary users with a means to obtain information on the location and frequency use of satellite earth stations so that they could avoid causing harmful interference. Furthermore, the *NPRM* proposed a

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[24] *See Petition for Interim Relief*, filed by the Fixed Point-to-Point Communications Section, Wireless Communications Division of the Telecommunications Industry Association on November 2, 1998; *Emergency Request for Immediate Relief*, filed by the Independent Cable & Telecommunications Association on November 5, 1998.

[25] *See* Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.3 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite Service Use, *Order*, IB Docket No. 98-172, 14 FCC Rcd 3086 (1999) (*18 GHz Relief Order*).

[26] *See id.* We reasoned that: (1) there was no other spectrum available at that time in the 18 GHz band or any other band for new or existing PCO operations; (2) PCOs would be unable to meet consumer needs for new services if relief was not granted; and (3) maintaining the proposed cut-off date for PCOs would be inconsistent with our expressed goal of increased competition in the provision of new video services.

[27] *Id.* ¶ 14. We also adopted several requirements to prevent warehousing of the spectrum involved.

[28] *See 18 GHz NPRM* ¶ 43. It should be noted that GSO/FSS and NGSO/FSS operators propose to blanket license small antenna satellite earth stations that are transmit/receive end user terminals; thus, we consider both the uplink and downlink portions of the Ka-band in our consideration of blanket licensing.

requirement for blanket licensees to report to the Commission on the number of satellite earth stations brought into service annually.[29]

16. In the *NPRM*, in response to a Petition for Rulemaking filed by DIRECTV Enterprises, Inc. ("DIRECTV"),[30] we proposed to allocate the 17.3-17.8 GHz band to BSS and the 24.75-25.25 GHz band for BSS feeder link use, with implementation of these allocations effective April 1, 2007.[31]

IV. DISCUSSION

17. The vast majority of commenters agreed with our tentative conclusion that co-frequency sharing between terrestrial fixed service and ubiquitously deployed FSS earth stations in the 18 GHz band is not feasible, and that the public interest would be best served by separating these operations into dedicated sub-bands.[32] We continue to believe that separation of these operations into different dedicated sub-bands is an effective frequency management technique to resolve problems of coordinating terrestrial fixed service links with ubiquitously deployed satellite earth stations.[33] As Teledesic notes, band segmentation, in conjunction with our blanket-licensing regime, "will allow for ubiquitous deployment of GSO and NGSO satellite earth terminals, and for much denser deployment of terrestrial fixed stations than would otherwise be possible."[34] While we generally agree with this principle, we have found it impossible to satisfy the full requirements of all of the services wishing to operate in the 18 GHz band through strict adherence to the principle of band segmentation. Although sharing between ubiquitously deployed FSS earth stations and terrestrial fixed stations clearly is not feasible, we have developed a band segmentation plan that would also provide for non-ubiquitously deployed FSS

[29] *See id.* ¶ 45.

[30] *See Public Notice*, Report No. 2208 (rel. July 1, 1997). The Commission placed the petition on public notice and assigned it rulemaking number RM-9118. *See id.* Although the petition also requested that the Commission adopt a 4.5° orbital spacing policy for use in the 17.3-17.8 GHz and 24.75-25.25GHz bands, the Commission concluded that it was premature to address this issue at the present time. *See 18 GHz NPRM* ¶ 82.

[31] These allocations conform to the International Telecommunication Union Region 2 BSS allocation. *See* ITU Radio Regulations Footnote S5.517 (stating that the Region 2 allocation to BSS in the 17.3-17.8 shall be afforded primary status as of April 1, 2007); ITU Radio Regulations Footnote S5.535 (stating that the 24.75-25.25 GHz band shall be designated for feeder links of BSS).

[32] *See supra* notes 8-9.

[33] *See* API Comments at 6 (noting that at recent meetings of the National Spectrum Managers Association and the Fixed Wireless Communications Coalition, there were reports of coordination difficulties in the 4 GHz frequency band, due to the deployment of satellite earth stations); CTIA Comments at 5 ("CMRS carriers raise serious concerns as to the feasibility of sharing in the 18 GHz band due to frequency coordination problems and the adverse impact on new or expanded microwave uses"); ICTA Reply Comments at 2 ("There is simply no viable method for private cable operators to coordinate with potentially tens of thousands of blanket-licensed GSO/FSS users deployed at unknown locations").

[34] Teledesic Reply Comments at 3; *see also* Comments of Pegasus Development Corporation at 6 (stating that segmentation "is necessary for consistently high quality reception of Ka-band FSS signals in urban areas and the achievement of a truly national ubiquitous satellite service").

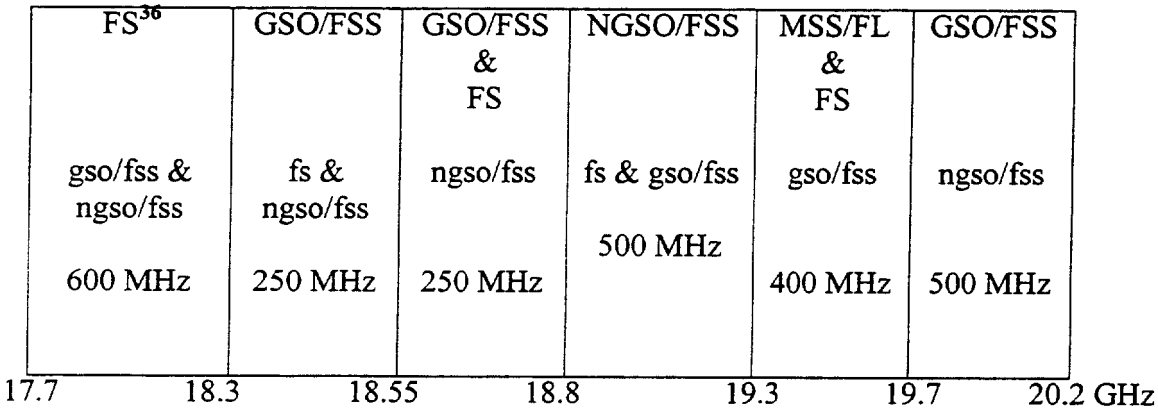
earth stations on a co-primary basis with the terrestrial fixed service on a coordinated basis. To that end, we have constructed a band plan that includes some co-primary designations. We find that this approach best serves the public interest, providing the various services with a form of access to the frequency spectrum that is both feasible and functional. We now discuss our initial redesignated band plan proposals and adopt a final band plan.

A. Band Plan

1. Initial Proposals

18. The band plans proposed in the *NPRM* resulted from extensive public comment that focused on the identification of the spectrum requirements of the different services authorized to operate in the 18 GHz band. In developing specific band redesignation proposals, we proceeded with the goal of striking a balance between meeting the spectrum requirements of the different services while best serving the public interest. In the *NPRM*, we tentatively concluded that the proposed band redesignation plans ensure continued development of terrestrial fixed service and FSS in the 18 GHz band and efficient use of this spectrum.[35]

19. Primary Proposal. The *18 GHz NPRM* proposed the following band plan:



20. As shown above, the Commission proposed in the *NPRM* to designate to terrestrial fixed service 600 *MHz* of spectrum for primary use at 17.7-18.3 GHz. The Commission also proposed designation for the terrestrial fixed service of 650 *MHz* of spectrum for co-primary use at 18.55-18.8 GHz (with GSO/FSS) and 19.3-19.7 GHz (with MSS/FL).[37] The Commission further proposed to designate to GSO/FSS 250 *MHz* of spectrum at 18.3-18.55 for primary use

[35] *See 18 GHz NPRM* at ¶ 24.

[36] We proposed that, effective April 1, 2007, the 17.3-17.8 GHz frequency segment be designated for co-primary use by both terrestrial fixed service operations and BSS downlink use.

[37] *See 18 GHz NRPM* ¶ 30. We tentatively concluded that this 1250 MHz of primary use spectrum could accommodate the needs of terrestrial fixed services. We noted that the 17.7-18.3 GHz band could be used to accommodate CARS, terrestrial fixed video operators, and broadcast auxiliary services. Moreover, we noted that this spectrum, along with the 650 MHz of co-primary spectrum, should allow for the creation and implementation of a new channelization plan for terrestrial fixed services operating in the 18 GHz frequency band. *See id.* ¶ 31.

and an additional 250 *MHz* of spectrum for co-primary use at 18.55-18.8.[38] The Commission also proposed to designate 500 *MHz* of spectrum at 18.8-19.3 GHz for primary use by NGSO/FSS.[39] Finally, the *NPRM* proposed that MSS/FL would retain the 400 *MHz* of spectrum at 19.3-19.7 on a co-primary basis.[40]

21. Although most of the commenters supported our tentative conclusion that redesignation of the 18 GHz band into dedicated sub-bands is generally desirable, few commenters supported our primary proposal. The terrestrial fixed service industry generally argued that the primary proposal significantly reduced the spectrum available to their services and threatened their continued viability.[41] The FSS commenters argued that the proposed band plan failed to provide the necessary 1000 *MHz* of unencumbered, primary spectrum.[42] We fully discuss the primary proposal in our adoption of the final band plan below. We first, however, discuss the modified proposals put forth in the *18 GHz NPRM*.

22. Alternative Proposal. Along with the primary proposal, we requested that interested parties comment on the desirability of modifying our primary proposal by designating an additional 100 *MHz* at 18.3-18.4 GHz to be shared by terrestrial fixed service and GSO/FSS on a co-primary basis.[43] We stated that such a designation would give terrestrial fixed service 700

[38] *See id.* ¶ 30. We stated that the primary proposal's designation of this 500 MHz of spectrum to GSO/FSS, in addition to the 500 MHz of spectrum currently already allocated to GSO/FSS on a primary basis at 19.7-20.2 GHz, would provide GSO/FSS with 1000 MHz of downlink spectrum. We tentatively concluded that these designations would adequately accommodate the needs of GSO/FSS Ka-band satellite service. *See id.* ¶ 32.

[39] *See id.* ¶ 30. We tentatively concluded that this 500 MHz should satisfy NGSO/FSS spectrum requirements. *See id.* ¶ 32.

[40] *See id.* ¶ 30. We tentatively concluded that co-primary sharing in this band between MSS/FL and terrestrial fixed service operations should continue because of the limited number of MSS/FL earth stations expected to be deployed. *See id.* ¶ 32.

[41] *See, e.g.*, Comments of Tadiran Microwave Networks at attachment ("This *NPRM* SIGNIFICANTLY reduces the frequencies available to the FS, continuing the trend of erosion of FS spectrum by the Commission over the last several years"); TIA-Fixed Section Comments at 2-3. TIA-Fixed Section contends that the primary proposal reduces fixed service spectrum by 53.3%. It also points out that the remaining 46.7% must be shared between fixed service point-to-point services with fixed service point-to-multipoint service, and coordination between these service would be difficult, thus reducing the spectrum further. *See id.*; Comments of the Fixed Wireless Communications Coalition at 3-4 (arguing that our primary proposal reduces terrestrial fixed service use of the 18 GHz band by 53.3%, and that the inability of terrestrial fixed point-to-point licensees to coordinate effectively with terrestrial point-to-multipoint systems to avoid interference would reduce available spectrum for terrestrial fixed service users) (FWCC Comments).

[42] *See, e.g.*, Comments of GE American Communications, Inc. at 4-9 (arguing that the primary proposal "would reduce the amount of downlink spectrum realistically available to GSO/FSS systems to less than 1000 MHz") (GE Americom Comments); Comments of Hughes Electronics, Inc., at 2, 4-8 (stating that while Hughes supports band segmentation, GSO/FSS satellite systems require access to, at a minimum, 1000 MHz of primary spectrum) (Hughes Comments); Comments of PanAmSat Corporation at 2-4 (PanAmSat Comments). PanAmSat, however, recognizes that "it may be difficult to develop a band plan that both designates 1000 MHz for primary use by GSO/FSS and satisfies all other licenses." *Id.*

[43] *See 18 GHz NPRM* at ¶ 35.

MHz of contiguous spectrum (17.7-18.4), possibly making it easier to design a more flexible channelization plan for terrestrial fixed service.

23. Most of the comments addressing this modified proposal argue against its adoption. The Spectrum & Orbit Utilization Section of the Satellite Communications Division of the Telecommunications Industry Association (TIA-SOUS) argues that the Commission should reject this proposal because it goes against the basic premise of this proceeding.[44] TIA-SOUS cites consensus among terrestrial fixed service, FSS, and the Commission to support the assertion that sharing is not feasible. Loral Space & Communications Ltd. ("Loral") also strongly opposes designating an additional 100 *MHz* of spectrum in the 18.3-18.4 GHz band.[45] SBC Communications Inc. ("SBC") argues that an additional 100 MHz of spectrum may provide relief for terrestrial fixed service; SBC, however, does not sufficiently support how this would be the case.[46] We agree with the assessment of both TIA-SOUS and Loral, that adding an additional 100 MHz of co-primary spectrum to terrestrial fixed service in the 18.3-18.4 GHz segment would frustrate the desire to separate terrestrial fixed service from ubiquitously deployed satellite earth stations.[47] This designation under the modified proposal is moot, however, considering our decision to designate the entire 280 MHz of spectrum at 18.3-18.58 GHz to be shared among terrestrial fixed service and non-blanket-licensed GSO/FSS, on a co-primary basis.[48] Therefore, we reject our modified proposal that would have designated an additional 100 MHz of spectrum on a co-primary basis to terrestrial fixed service and GSO/FSS in the 18.3-18.4 GHz band.

24. The *18 GHz NPRM* also sought comment on designating the entire 17.7-18.8 GHz band to be shared on a co-primary basis by terrestrial fixed service and GSO/FSS.[49] We proposed this band plan on the assumption that it may be possible for GSO/FSS to use gateway type terminals throughout the 17.7-18.8 GHz band, allowing for continued sharing.

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[44] *See* Comments of Spectrum & Orbit Utilization Section of the Satellite Communications Division of the Telecommunications Industry Association at 2-3 (TIA-SOUS Comments).

[45] *See* Comments of Loral Space & Communications Ltd. at 3-4 (Loral Comments). Loral's objection to this modified proposal, like that of TIA-SOUS, is based on the belief that sharing between the services is not feasible. Loral states that "[t]his proposal fundamentally conflicts with the Commission's observations that FS/FSS sharing is not feasible in these bands." *Id.* at 4.

[46] *See* Comments of SBC Communications, Inc. at 6-7 (SBC Comments). SBC makes an unsupported, general statement that the additional 100 MHz would help terrestrial fixed services.

[47] Under our primary proposal, the 18.3-18.55 GHz band would house ubiquitous blanket-licensed satellite earth stations; thus, under this modified proposal, these FSS systems would have to share the 18.3-18.4 GHz band with terrestrial fixed service. This proposal would therefore reduce the amount of spectrum that could be blanket licensed for the FSS.

[48] *See infra.*

[49] *See 18 GHz NPRM* at ¶ 36. We asked whether continued sharing in this segment of the 18 GHz band would better meet the needs of GSO/FSS and terrestrial fixed service licensees.

25. Although none of the commenters directly supported this band plan or our assumptions about the use of gateways throughout the 17.7-18.8 GHz band, Comsearch articulated a similar sharing proposal. Specifically, Comsearch proposed that the Commission allocate the 17.7-18.55 GHz band on a co-primary basis to GSO/FSS and terrestrial fixed service.[50] Comsearch argued that maintaining a co-primary designation in the 17.7-18.55 GHz band allows for the continued viability of those systems currently utilizing the existing 1560 MHz frequency separation for wideband two-way terrestrial fixed service operations and Cable Television Relay Service ("CARS") or Private Cable 6 MHz channels.[51]

26. Airtouch argues that the Comsearch proposal is unacceptable because it requires terrestrial operations to lose the only primary allocation to terrestrial fixed services provided by the Commission in our primary proposal.[52] Airtouch correctly points out that if adopted, the Comsearch proposal would result in the loss of access to 750 MHz of previously co-primary spectrum for terrestrial fixed service operations, with no primary designation for FS.[53] FWCC also rejects the proposal put forth by Comsearch.[54] FWCC argues that the co-primary allocation at 17.7-18.55 GHz proves to be a serious defect in Comsearch's proposed band plan because the record in this proceeding generally reflects the notion that terrestrial fixed service operations cannot share spectrum with ubiquitously deployed GSO/FSS earth stations. In fact, Comsearch admits this much to be true.[55] We agree with Airtouch and FWCC. Mandating terrestrial fixed service operations to continue to share the entire 17.7-18.55 GHz band, as proposed by Comsearch, is inequitable, as it allows FSS systems full use of the band while taking 750 MHz of co-primary spectrum from the terrestrial fixed service. We also have concerns about the feasibility of sharing between the services in parts of this band. The record clearly reflects that sharing between ubiquitously deployed satellite earth stations and terrestrial fixed service is not technically or operationally feasible because fixed stations would constrain the locations at which earth stations could be successfully operated; thus, under the Comsearch proposal, satellite

[50] *See* Comsearch Comments, at 4.

[51] *See id.* at 4-5. Comsearch further contends that this allocation provides alternative spectrum for displaced narrowband split channels operating on a 5 MHz bandwidth. *See id.* The current frequency separation provisions for CARS use in the 18 GHz band can be found at 47 C.F.R. § 78.18 (4). Other terrestrial fixed service systems operate according to a channeling plan defined in the Commission's Rules. *See* 47 C.F.R. §§ 74.402, 78.18, 101.147.

[52] *See* Reply Comments of Airtouch Communications, Inc. at 10-11 (Airtouch Reply Comments). Airtouch also contends that "[s]hared use of spectrum will significantly degrade the ability of terrestrial fixed service users to deploy new systems and provide important services." *Id.* at 8. "Accordingly, Comsearch's proposal fails to serve the public interest and should be rejected." *Id.*

[53] *See id.* at 10-11. Airtouch notes that, under the Comsearch proposal, FSS operations maintain the full 2000 MHz of spectrum in the 18 GHz band, of which 750 MHz is a primary designation, while terrestrial services would have no unshared primary spectrum.

[54] *See* Fixed Wireless Communications Coalition Reply Comments at 6 (FWCC Reply Comments).

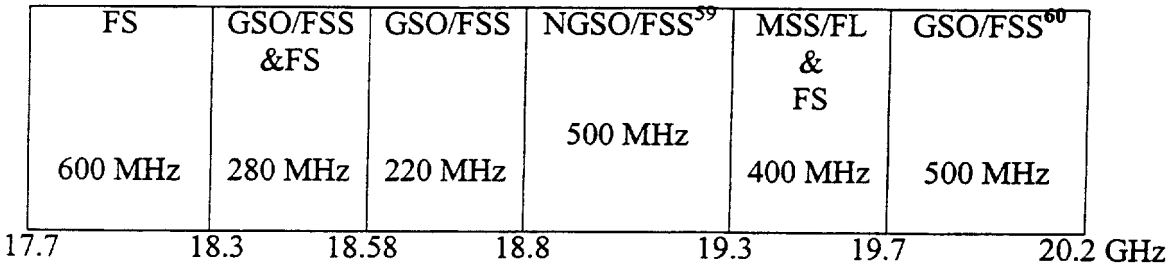
[55] *See* Comsearch Comments at 6 (stating that they "agree with the Commission's tentative conclusion that sharing between ubiquitously deployed earth stations and terrestrial fixed microwave is impractical"). Comsearch, however, proposed that FSS use in this band would be non-ubiquitous. *See id.* at 5. Comsearch recommends that service rules be implemented to solve any possible sharing problems that would result from its proposal. *See id.* at 7-8.

users would not be able to use this band for blanket-licensed earth stations.[56] For the aforementioned reasons, and due to insufficient support in the record for either our modified proposal or the Comsearch proposal, we reject both proposals to maintain a co-primary allocation for FSS and terrestrial fixed service in the 17.7-18.8 GHz band as inconsistent with the public interest.

27. Finally, we requested comment on the feasibility of retaining our current band plan, which would provide for continued sharing in the entire 17.7-19.7 band.[57] As previously stated, the overwhelming majority of commenters believe that segmenting the 18 GHz band between terrestrial fixed service and FSS operations is necessary.[58] We agree with the wealth of commenters that supported segmentation and for the reasons stated above we reject this proposal.

2. Adopted Band Plan

28. This *Report and Order* adopts the following band plan and amends the Table of Frequency Allocations accordingly:



Under the band plan the Commission is adopting, 600 MHz at 17.7-18.3 GHz is designated for primary use by terrestrial fixed service operations and 680 MHz of co-primary spectrum from the 18.3-18.58 GHz band (with GSO/FSS) and 19.3-19.7 GHz band (with MSS/FL), for a total of 1280 MHz of available spectrum for FS. We designate 220 MHz to GSO/FSS for primary use in the 18.58-18.8 GHz band, and 280 MHz for co-primary use in the 18.3-18.58 GHz band (with terrestrial fixed service), for a total of 500 MHz of available spectrum for GSO/FSS.[61] We designate 500 MHz of primary spectrum to NGSO/FSS at 18.8-19.3 GHz. Finally, we retain the allocation of 400 MHz of spectrum at 19.3-19.7 GHz to MSS/FL on a co-primary basis (with terrestrial fixed service). We further note that NTIA has stated that the Government currently

[56] *See* ICTA Comments.

[57] *See 18 GHz NPRM* ¶ 38.

[58] *See supra* notes 8-9 and accompanying text.

[59] Low power point-to-multipoint terrestrial fixed systems may continue to be licensed and operate on a co-primary basis with NGSO/FSS in the 18.82-18.87 GHz and 19.16-19.21 GHz bands.

[60] We show the band 19.7-20.2 GHz in this spectrum table merely to illustrate the total spectrum available to the GSO/FSS.

[61] GSO/FSS licensees also have 500 megahertz of primary downlink spectrum at 19.7-20.2 GHz.

operates both GSO and NGSO satellite networks in the band 17.8-20.2 GHz and that they plan for these operations to continue in this band indefinitely.[62]

29. The band plan we adopt today differs from the primary proposal articulated in the *18 GHz NPRM* in several ways intended to address the concerns expressed in the record. First, to ensure the continued viability of many existing terrestrial systems, we upgrade the secondary allocation proposed for terrestrial fixed service in the 18.3-18.58 GHz band to co-primary status. Thus, the CARS, PCO and other services now using a contiguous block of spectrum in the 18.14-18.58 GHz band will continue to be able to use this spectrum without dividing their operations into two band segments, as proposed in the *NPRM*. Second, to further the needs of GSO/FSS licensees in the 18 GHz band, we eliminate the co-primary allocation to terrestrial fixed service in the 18.58-18.8 GHz band, resulting in a primary, albeit smaller, designation for GSO/FSS in this band segment. Finally, we decline to allow new secondary operations on a non-interference basis, by either the terrestrial fixed service or the FSS, throughout the 17.7-19.7 GHz band, as discussed further below.

30. A review of the record leads us to conclude that this redesignated band plan results in an equitable and balanced approach to meeting the needs of the various existing and future operations in the 18 GHz band. We recognize that the adopted band plan does not provide a full 1000 Megahertz of unshared Ka-band downlink spectrum for GSO/FSS operations, as has been requested by many GSO/FSS licensees. Nevertheless, we believe that the 720 MHz of unshared downlink spectrum at 18.58-18.8 GHz and 19.7-20.2, plus the flexible rules that permit sharing of 280 megahertz at 18.3-18.58 GHz, should provide a reasonable basis for GSO/FSS operations to be undertaken. While we realize the some GSO/FSS systems have already been designed, we expect that the current system designs of the GSO/FSS systems can proceed with some modification or that sharing agreements can be reached to permit the use of these designs. Moreover, we note that the same total capacity for GSO/FSS services is still available in locations where coordination can be achieved. We conclude that this plan will, through the judicious choice of band segments subject to co-primary sharing, significantly lower any consequential administrative costs of coordination. Furthermore, this plan goes a long way toward facilitating the deployment of new services by designating different dedicated sub-bands for ubiquitously deployed FSS earth stations and nearly ubiquitous terrestrial fixed services in the 18 GHz band, thereby serving the public interest.[63] A brief discussion on the designation of each band follows.

[62] See letter from William T. Hatch of the NTIA to to Dale M. Hatfield of the FCC, dated March 29, 2000.

[63] Throughout the 18 GHz band there are a number of existing terrestrial fixed service channelization plans. These channelization plans include paired channels that can be used for either expanded one-way or two-way communications. While not modifying any of these channelization plans at this time, the revised band designations have been designed to have a minimal impact on the existing channel structure, in order to balance the spectrum requirements of existing operations and the requirements of new and innovative services. Although we could adopt revised channelization plans consistent with the redesignations adopted in this *Report and Order*, we choose not to do so at the present time, preferring instead to continue to monitor implementation developments in the 17.7-19.7 GHz band.

31. 17.7-18.3 GHz Frequency Band. We designate the 17.7-18.3 GHz frequency band to terrestrial fixed service for primary use. Prior to this rulemaking, this segment of the 18 GHz band was designated for shared co-primary use between GSO/FSS and terrestrial fixed service operations. Currently, the 17.7-18.3 GHz band is used for a wide variety of common carrier, mass media, and private fixed terrestrial point-to-point or point-to-multipoint services, as described in Parts 74, 78 and 101 of the Commission's Rules. In designating the 17.7-18.3 GHz band for primary use by terrestrial fixed service operators, we recognize that this is an important segment of the 18 GHz band for existing and future terrestrial fixed service operations. We achieve our stated goal of ensuring the continued viability of the terrestrial fixed service by avoiding any future interference from space stations and the need to relocate stations to protect future earth stations. The redesignation of this band to primary status will also generally facilitate the relocation of terrestrial fixed service operations from other parts of the 17.7-19.7 MHz or other frequency bands by eliminating the need for coordination with satellite earth stations. It will also facilitate the deployment of new terrestrial fixed stations by eliminating coordination requirements between the fixed and fixed satellite services, thereby lowering transaction costs for terrestrial fixed operators.

32. Commenters generally agreed that this part of the spectrum should be allocated to terrestrial fixed service on a primary basis. ABC, Inc. was especially supportive of this designation in stating that the allocation "properly recognizes the importance of existing terrestrial fixed service operations."[64] Other commenters either expressly requested a primary designation to terrestrial fixed service in the 17.7-18.3 GHz band or implicitly did so by failing to suggest that we modify this portion of the band while specifically requesting that we change other segments of the 18 GHz band.[65]

33. Comsearch and Hughes request that we designate portions of the 17.7-18.3 GHz band for services other than terrestrial fixed service on a primary basis.[66] Comsearch's proposal would make no change from the current service designations and Hughes' proposal would redesignate spectrum currently used for several types of fixed service, including PCO's operating in the 18.14-18.58 GHz band. We reject both proposals in part, noting that a primary designation to the fixed service below 18.3 GHz is necessary to ensure that terrestrial fixed stations, including those 18 GHz stations that may be required to relocate pursuant to this *Report and*

[64] Comments of ABC, Inc. at 2 (ABC Comments).

[65] *See* Comments of Pegasus Development Corp. at 4-7 (proposing two alternative band plans to our primary proposal, both of which expressly propose to designate the 17.7-18.3 GHz segment to terrestrial fixed service for primary use) (Pegasus Comments); Comments of Tadiran Microwave Networks at 3 (requesting that the Commission designate spectrum, including the 17.3-18.3 GHz band, for primary use by terrestrial fixed service operators); TIA-Fixed Section Comments at 12 (urging the Commission to designate the 17.7-18.58 GHz segment to terrestrial fixed service on a primary basis); TIA-SOUS Comments at 4 ("The 17.7-18.3 GHz portion of the Ka-band *should be designated FS point-to-point links*").

[66] *See* Comsearch Comments at 4 (asking that the Commission adopt a band plan that retains a co-primary status in the 17.7-18.55 GHz band for terrestrial fixed service and GSO/FSS shared use); Hughes Reply Comments at 7-11 (proposing that we adopt a band plan that designates the 17.8-18.6 GHz band to terrestrial fixed service on a primary basis and thus grant primary status to GSO/FSS in the 18.1-18.6GHz segment). Their proposal overlaps the band under discussion in this section of this *Report and Order*.

Order, will have access to a sufficient amount of spectrum. The Hughes proposal fails to recognize the increasing demand the terrestrial fixed service will place upon this part of the spectrum as well as the vast numbers of wideband CARS, PCO and other services already operating in the 18.14-18.58 GHz band. We believe that this portion of the 18 GHz band is vital to the success of fixed station relocation efforts and the continued viability of wireless cable providers that provide direct competition to traditional cable operators. Furthermore, we have previously recognized that there is currently no other spectrum available either in the 18 GHz band or any other band at the present time to accommodate adequately existing or future PCO operations needed to meet consumer demand.[67] For these reasons, we designate the 17.7-18.3 GHz band for primary terrestrial fixed use and reject Comsearch and Hughes' proposals to designate portions of the 17.7-18.3 band to anything other than terrestrial fixed service on a primary basis. .

34. 18.3-18.58 GHz and 18.58-18.8 GHz Frequency Bands. We designate the 18.3-18.58 GHz frequency band for co-primary shared use by terrestrial fixed service and GSO/FSS operations. In revising our band plan as discussed above, we decline to adopt the portion of our *18 GHz NPRM* proposal that would designate 250 MHz of spectrum at 18.3-18.55 GHz to GSO/FSS on a primary basis. We conclude that the proposal would place in jeopardy the viability of the extremely large number of fixed stations, CARS, wireless PCOs and other links[68] operating in this band. We also conclude that GSO/FSS licensees would have a difficult time implementing ubiquitous earth stations in this segment due to the large number of terrestrial fixed services currently operating in this band.[69] To help meet the spectrum needs of GSO/FSS, we designate the 220 MHz of spectrum at 18.58-18.8 GHz for primary use by GSO/FSS. In adopting this redesignation, we eliminate the co-primary terrestrial fixed service allocation present before this *Report and Order* and proposed in the *18 GHz NPRM*. We revisit the designation as put forth in our primary proposal as a result of compelling arguments from some of the commenters from both the terrestrial fixed service industry and the FSS industry, as discussed below.

35. In addressing the portion of our *18 GHz NPRM* primary proposal that designated the 18.3-18.55 GHz band to GSO/FSS on a primary basis, ICTA argued this designation would cause CARS and PCOs to lose the 440 MHz of contiguous spectrum currently being employed to

[67] *See 18 GHz Relief Order, supra*. We note that the Commission is currently considering in a pending rulemaking whether to open the 12 GHz band to PCOs and multichannel video program distributors (MVPD). *See* Petition for Rulemaking to Amend Eligibility Requirements in Part 78 Regarding 12 GHz Cable Television Relay Service, *Notice of Proposed Rulemaking*, CSB Doc. No. 99-250, (1999). Nothing in this *Report and Order* is intended to prejudge that rulemaking.

[68] While definitions of "link" may vary, we define a link as one point-to-point or point–to-multi-point channel, as specified in one of our applicable channelization plans. Using that definition, there are approximately 170,000 fixed links in the 18.142-18.580 GHz band.

[69] ICTA contends that there are currently 2,400 PCO links in the 18.142-18.58 GHz band throughout the United States. ICTA notes that "[b]ecause the configuration of most private cable links follows a hub and spoke architecture where a single transmit site will serve multiple receive sites, each link creates its own exclusion zone (that can extend as far as 45 miles from the cable transmit site) where satellite receivers will be unable to operate." ICTA Comments at 14. ICTA further states that their systems would be virtually useless without the full block of bandwidth available. ICTA comments at 27.

serve subscribers.[70] If we were to designate the 18.3-18.55 GHz frequency band to GSO/FSS on a primary basis, cable operators would be unable to reasonably expand operations in this band to compete effectively with existing coaxial cable systems.[71] The detrimental effect on PCOs from such a loss of spectrum is increased by the fact that there is currently no other spectrum available for such systems. GE American Communications, Inc. (GE Americom), in arguing that GSO/FSS should be designated 500 MHz of spectrum in the 18.1-18.8 GHz range, also proposes that terrestrial services operating in these bands would be required to relocate.[72] GE Americom, however, fails to recognize that there is currently no other available spectrum for PCOs. TIA-Fixed Section argues that requiring these point-to-multipoint one way video distribution services to relocate to the contiguous allocation for terrestrial fixed service in the 17.7-18.3 band would not work. Specifically, TIA-Fixed Section contends that relocating Multi-channel Video Programming Distribution services (MVPDs) into the 17.7-18.3 GHz band would require that these services share spectrum with fixed point-to-point links, a proposition that in reality is "virtually impossible due to the coordination difficulties between these services in the metropolitan areas where these services both reside."[73] We agree. In fact, we have acknowledged that this difficulty in coordination is the primary reason that we have traditionally licensed point-to-multipoint operations and point-to-point terrestrial fixed service operations in separate portions of the 18 GHz band.[74]

36. Furthermore, as KaStar notes in its comments, designating the 18.3-18.55 GHz band to GSO/FSS on a primary basis would be unworkable for GSO/FSS as well. KaStar argues that GSO/FSS operators would have a difficult time deploying ubiquitous earth stations in this band because there are a large number of existing terrestrial fixed services that currently use this band

[70] *See* ICTA Comments at 6. As previously stated, CARS and PCOs use channels in the 18.142-18.58 GHz band.

[71] AESCO Systems, Inc. correctly notes that many coaxial cable systems have been upgraded to 550 MHz and 750 MHz systems, allowing those cable operators to offer consumers more channels. Eliminating the use of 280 MHz of contiguous spectrum, as proposed in the *18 GHz NPRM*'s primary proposal, would inhibit PCOs operating in the 18 GHz band from effectively competing with these upgraded coaxial cable systems. *See* Comments of AESCO Systems, Inc. at 3. The proposed plan to limit terrestrial fixed service in this band would have the effect of rendering these terrestrial services non-competitive with wired cable service, since the systems operate in a block conversion mode (using existing analog 6 MHz channels) and need to carry as many channels as possible. *See* ICTA comments Engineering Statement at 4. The remaining spectrum available to PCOs under our primary proposal equals 158 MHz (18.142-18.3 GHz band) plus another 30 MHz at 18.55-18.58. At 6 MHz per channel, this would equate to at most 31 channels, and that assumes that equipment can be designed to overcome the proposed spectrum separation (18.14-18.3 GHz and 18.55-18.8 GHz).

[72] *See* GE Americom Comments at 6-7.

[73] TIA-Fixed Section Comments at 2; *see also* Comments of RCN Telecom Services, Inc. at 7-9 (arguing that under our primary proposal, the primary allocation of the 17.7-18.3 GHz and co-primary allocation of the 18.55-18.8 GHz band do not provide viable alternatives for private video providers) (RCN Comments); ICTA Comments at 7 ("The assumption that the 17.7-18.3 GHz band provides a viable alternative for the private cable industry is fundamentally flawed").

[74] *See 18 GHz NPRM* ¶ 27.

in urban areas. [75] These existing services would be maintained under the rules we adopt today. PanAmSat concurs and states that if we conclude that 750 MHz of spectrum is sufficient to meet the spectrum needs of GSO/FSS, we should not designate the 18.3-18.55 GHz band to fulfill 250 MHz of those needs.[76] PanAmSat reasons that the reported wide deployment of CARS systems in that band would make it virtually impossible for the GSO/FSS industry to deploy ubiquitous small earth stations in the band, unless CARS systems were forced to relocate. Under the relocation rules we adopt today, such a mass relocation would prove costly to the GSO/FSS operators, possibly making it an unattractive band for such services and possibly slowing deployment of the advanced services such systems may bring to the public. We agree with this assessment of KaStar and PanAmSat. One of the goals of this proceeding is to limit the number of necessary, and possibly difficult, coordinations that must take place between ubiquitously deployed blanket licensed earth stations and terrestrial fixed service operations. We believe, however, that we should leave it to the satellite licensees to decide how the GSO/FSS service can best be deployed in shared bands, where only their stations are subject to interference. Furthermore, Teledesic argues that "both GSO FSS operators and FS operators would appear to benefit if the 250 MHz of GSO FSS 'gateway' spectrum ran from 18.3-18.55 GHz, rather than from 18.55-18.8 GHz."[77] Teledesic correctly states that terrestrial fixed services would benefit from the maintenance of 250 MHz of spectrum at 18.3-18.55 GHz, resulting in a larger contiguous block of spectrum than was proposed in the *NPRM*. Such a redesignation eliminates the possible need to relocate the numerous CARS and PCO operations currently using the 18.3-18.58 GHz band. It also affords PCOs the ability to maintain and upgrade their existing systems to compete effectively against franchised cable systems. In exchange for giving up primary status in the 18.3-18.55 GHz band, Teledesic proposes that we designate the 18.55-18.8 GHz band to GSO/FSS for primary status.[78] This "swap" of band allocations is supported by several of the commenters.[79]

37. Airtouch argues that foreclosing the fixed service in the 18.55-18.8 GHz band is acceptable, due, in part, to the fact that the NGSO/FSS primary allocation at 18.8-19.3 GHz will be rendered unusable for future CARS services because the fixed service channels in the 18.58-18.82 GHz band are paired with those in the 18.8-19.3 GHz band.[80] Specifically, the

[75] *See* KaStar Satellite Communications Corporation Comments at 7-8 (arguing that coordination in this band will be extremely difficult, "resulting in indefinite delays or, worse yet, the inability [of FSS operators] to utilize the spectrum in a meaningful way") (KaStar Comments).

[76] *See* PanAmSat Comments at 3.

[77] Teledesic Comments at 7.

[78] *See id.*

[79] *See, e.g.*, Airtouch Reply Comments at 5 (recommending that we "modify the band plan to allow terrestrial FS and Geostationary Orbit Fixed Satellite Service shared use of the 18.3-18.55 GHz band, in lieu of 18.55-18.8 GHz, in order to maintain, as closely as possible, current terrestrial uses of the 18 GHz band); KaStar Comments at 7-10 (urging the Commission to modify the band plan by "[d]esignat[ing] 250 MHz from 18.3-18.55 GHz for GSO FSS and FS use on a co-primary basis; [and] [d]esignat[ing] 250 MHz from 18.55-18.8 GHz for GSO FSS use on a primary basis"); Lockheed Comments at 3-5; TIA-Fixed Section Comments at 3-4 (requesting that we modify our band plan to give terrestrial fixed service co-primary status in the 18.3-18.58 GHz band and a primary allocation to GSO/FSS at 18.58-18.8 GHz).

narrowband allocation at 18.58-18.82 GHz is paired for go/return use with the 18.92-19.16 GHz band, a band that, pursuant to this *Report and Order* is now designated for NGSO/FSS operations on a primary basis. AT&T Wireless similarly states that "[I]f the Commission reallocates the upper half of this go/return frequency band to secondary status, it eliminates the pairing capability and effectively eliminates the ability of fixed terrestrial service providers to use the lower half as well."[81]

38. For this reason, inter alia, we see no need to maintain the co-primary status for terrestrial fixed services in the 18.58-18.8 GHz band. Although this eliminates many, if not all, of the narrowband channels for terrestrial fixed services, we note that permitting continued operation on a short-term basis[82] and rechannelization and relocation on a long-term basis should provide for the continued viability of these services. We discuss the issue of secondary designation later in this *Report and Order*.

39. Lockheed observes that we based our proposal to designate the 18.55-18.8 GHz band for co-primary use by GSO/FSS and terrestrial fixed service on two factors. First, we noted that Lockheed and other GSO/FSS licensees planned to operate gateway earth stations utilizing large antennas that would allow sharing with terrestrial fixed service operations to continue; and second, we stated that the strict pfd limit applicable in the 18.6-18.8 GHz band to protect Earth Exploration-Satellite Service (EESS) and SR services would require the use of higher gain antennas, making sharing a possibility.[83] Since the release of the *18 GHz NPRM*, however, Lockheed modified its initial application and in the Astrolink-Phase II™ System application expresses its intention to employ ubiquitously deployed small user terminals in the 18 GHz band.[84] Furthermore, Lockheed notes that "the strict p.f.d. limit applicable to FSS operations in the 18.6-18.8 GHz band is under review within the United States and the ITU, and Lockheed Martin understands that it may become less stringent pursuant to an agreement reached among GSO FSS operators, the EESS community, and the U.S. government."[85]

40. Both Bellsouth and TIA-Fixed Section argue that, should we designate the 18.3-18.55 GHz band for co-primary use by GSO/FSS and terrestrial fixed services, we should consider

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[80] *See* Airtouch Comments at 8.

[81] Comments of AT&T Wireless Services, Inc. at 3. By "lower half," we believe they are referring to paired channels in the 18.5-18.8 GHz band.

[82] *See* discussion of continued co-primary use by existing fixed stations infra.

[83] *See 18 GHz NPRM* ¶ 32.

[84] *See* Lockheed Martin Corporation Application for Authority to Modify its Authorization for a Global Ka-band Satellite Communications System in Geostationary Orbit, File No. 35-SAT-MP/ML-98, 2, 9 (filed Dec. 22, 1997); Lockheed Martin Corporation Application for a Global Ka-band Satellite Communications System in Geostationary Orbit, File Nos. 39 through 43-SAT-P/LA-98, 37 (filed Dec.22, 1998). We note that this system proposes to use 125 MHz channels extending down to 18.55 GHz, which would require coordination with the FS if we were to extend the co-primary FS allocation by 30 MHz up to 18.58 GHz.

[85] *See* Lockheed applications, note 91, and ITU-R Document WP-4A/29, *Proposed Recommendation to Change the Power-flux Density Limits in the 18.6 GHz-18.8 GHz Band* (1998). We note that this recommendation was adopted at the World Radio Conference 2000 (WRC-2000) and will become effective internationally on January 1, 2002.

extending that designation 30 MHz to 18.58 GHz to maintain all of the available channels for CARS, PCO, and other MVPD use.[86] Bellsouth states that "[while] MVPDs would retain co-primary status in the 18.3-18.5 GHz portion, and would face somewhat fewer interference concerns, the 18.5-18.58 GHz band would still be lost to MVPDs under this alternative. Such a result is untenable."[87] We agree. Multichannel video operators in the 18.142-18.58 GHz band are typically licensed for the full 440 megahertz of bandwidth and have the capability to provide 72 channels of video programming to all of their customers. These systems continue to require this capacity if they are to remain competitive with traditional cable systems and DBS. Additionally, when these systems eventually begin a transition to digital technologies, they will require the flexibility provided by this full bandwidth to make that transition with minimal impact on analog subscribers. Because these systems are providing essentially a "consumer" service, the transition to digital technologies will have to be phased in over time, requiring access to the full spectrum for some significant time into the future. Prior to and during this transition, existing multichannel video operators contend they require the ability to provide the full menu of programming if they are to be able to build their customer base and remain competitive with other providers of multi-channel video services. While the expansion of the band shared by terrestrial fixed and GSO/FSS systems from 18.3-18.55 GHz to 18.3-18.58 GHz will impose additional operational or design constraints on the licensees of GSO/FSS systems operating in the 18.3-18.58 GHz band, we believe that opportunities exist for the operators of FSS and terrestrial systems to reach private commercial agreements that will allow each service to meet its needs.[88] We encourage such private agreements as the best method to accurately balance the various commercial interests in these bands. We find that ensuring the continued viability of the competitive multi-channel video systems in this portion of the spectrum necessitates providing for shared use of the spectrum up to 18.58 GHz. Furthermore, we believe that a commercial approach to resolving sharing in the 18.55-18.58 GHz band may allow for more innovative, spectrally-efficient solutions to be employed than would be possible if we provided sole primary access to this band to either the terrestrial fixed or GSO/FSS services.

41. In consideration of the above comments and industry agreement as noted *infra*, we conclude the following: (1) PCOs using the 18 GHz band, for both current and future operations, will not be able to compete effectively against franchised cable operators if we redesignate the 18.3-18.55 GHz band for primary use by GSO/FSS operations; (2) GSO/FSS will be unable to effectively blanket license ubiquitously deployed earth stations in the 18.3-18.55 GHz band due to the large numbers of CARS and PCO operations currently using this band, especially in metropolitan areas; (3) relocation of CARS and PCO operations from the 18.3-18.55 GHz band, pursuant to the relocation procedures adopted in this *Report and Order*, would prove costly to GSO/FSS operators entering the band due to the vast number of terrestrial operations in this band, possibly slowing deployment of satellite systems in the band; (4) GSO/FSS will be unable

[86] *See* BellSouth Reply Comments at 7; TIA-Fixed Section Comments at 3-4.

[87] Bellsouth Reply Comments at 7.

[88] For example, PCOs might be willing to relinquish their operating rights within the 18.55-18.58 GHz band if the GSO/FSS operator provided 30 MHz of satellite programming directly to each PCO receiving site. Another option might be for the GSO/FSS operator to help PCO operators install new equipment that is more spectrally efficient.

to use spectrum in the 18.6-18.8 GHz band for ubiquitously deployed satellite earth stations if the pfd limits that exist in this band are not relaxed. We note, in this regard, that the U.S. made a proposal to the WRC-2000 that would establish a world-wide primary allocation to the Earth Exploration-Satellite Service (EESS) service in the 18.6-18.8 GHz band, as well as a relaxed pfd limit in the 18.6-18.8 GHz band of -95 (dBW/m^2) across the 18.6-18.8 GHz band for all angles of arrival. This proposal, which was adopted by WRC-2000, balances the need for a world-wide primary allocation for the EESS with the need for a more workable FSS pfd limit. Recognizing that the relaxed pfd limit would benefit FSS operators in the 18.6-18.8 GHz band, and after coordination with NTIA, we hereby adopt the WRC-2000 relaxed pfd limit within new section 25.208 (e) and appropriately modify FN US 255 of Section 2.106 of the Commission's Rules. Future use of narrowband terrestrial fixed service operations in the 18.55-18.8 GHz band, specifically the 18.58-18.82 GHz band, will be unavailable due to the inability to access its paired spectrum at 18.92-19.16 GHz.[89] Finally, we conclude that the public interest is best served by designating the 18.3-18.58 GHz band for co-primary use by the terrestrial fixed service operations and GSO/FSS, and the 18.58-18.8 GHz band to GSO/FSS on a primary basis.

42. Further, we note that there is evidence in the record that a Joint Working Group, consisting of members of the FSS and terrestrial fixed service industries, worked "to define allocations to produce an (FS-Free) 250 MHz band for GSO/FSS use by swapping the FS services out of the 18.55-18.8 GHz band and moving the GSO/FSS primary assignment from 18.3-18.55 GHz to the free band."[90] This effort is consistent with our decision, but does not exactly mirror it. Therefore, we modify our *18 GHz NPRM* designation plan and designate 280 MHz of co-primary spectrum to terrestrial fixed service operations and GSO/FSS in the 18.3-18.58 GHz segment, and 220 MHz of primary spectrum at 18.58-18.8 GHz to GSO/FSS.

43. Additionally, we note that co-frequency sharing requires two modes of sharing: FSS space station with terrestrial fixed service and terrestrial fixed service with FSS earth stations. Currently, FSS space stations do not coordinate with terrestrial fixed service stations. The space stations must operate below a specified pfd limit that was designed to protect the fixed service. Because the record of this proceeding has established that such interference is nevertheless possible in certain circumstances, we need to ensure that interference to existing terrestrial fixed station receivers will not occur if the FS receivers are pointed at the FSS satellite.[91]

44. We recognize that there may be existing terrestrial fixed service links that have receiving antennas physically pointed toward the arc of the sky comprising the geostationary

[89] While we note this loss of narrowband channel pairs due to our redesignations, we expect that such losses could be recouped by the development of new narrowband channelizations, which could be overlaid within the remaining Fixed Service designations. FWCC made such a proposal in its comments at 5.

[90] Comments of Capital Broadcasting Co., Inc., *et al.* at 3.

[91] *See* CTIA Comments at 5 ("Unacceptable interference is likely to occur when microwave fixed services and satellite services operate in the same frequency bands, regardless of whether satellite co-primary operations are expected to be ubiquitously or non-ubiquitously deployed"); ICTA Comments at Appendix (noting that some existing terrestrial fixed systems will receive harmful interference from GSO/FSS systems because they point at the orbit).

satellite[92] orbit and therefore may be subject to interference from new GSO/FSS operations. These co-primary terrestrial links enjoy primary status in the frequency they occupy due to the "first-come, first-served" principle. Because terrestrial fixed services operating in the 18.3-18.8 GHz band were first to occupy this co-primary spectrum and there are currently no antenna pointing restrictions, they are recognized to have a right to point at the geostationary satellite orbit.[93] Maintaining such a right would result in the failure of sharing in the band, once the satellite systems actually begin operation. Therefore, another approach is needed. At the same time, we note that, subsequent to the adoption of this *Report and Order*, if future fixed station receivers in the band 18.3-18.58 GHz point at the geostationary-satellite orbit, they do so at their own risk, because this *Report and Order* clearly states that interference from space stations under such circumstances would be possible. We first address space-to-Earth sharing to establish the specific conditions for these relationships.

45. We conclude that the conditions for ensuring successful space-to-Earth sharing between the terrestrial fixed service and the GSO/FSS may not be present if any new terrestrial fixed service link receivers are pointed within 2 degrees of the geostationary satellite orbit.[94] If such receivers are pointed more than 2 degrees away from that Orbit, such pointing generally will provide approximately 18 dB of isolation, which should result in protection from space-borne interference. The potential for existing fixed links to be interfered with will be determined according to the following standard: we will consider any receiving existing terrestrial fixed stations pointed within 2 degrees of the orbit to be subject potentially to interference, and therefore establish this condition as a space station coordination trigger.[95] We see this licensee-based process as taking place in two phases: first, an evaluation of the actual potential for interference would be performed and the results considered by both the fixed station and the FSS station licensees; second, a method of resolution would be agreed upon and implemented.

46. Thus, we establish a coordination process referenced to a "Legacy List" of such terrestrial fixed service stations.[96] The appropriate GSO/FSS station licensee (the one towards

[92] This arc is from horizon to horizon, reaching its highest elevation angle for positions in the geostationary orbit at the longitudinal position of the observer.

[93] In the case of Fixed Stations in the 18.58-18.8 GHz band, the right to interference protection does not extend beyond the applicable period of continued co-primary status.

[94] While we do not require such pointing, we emphasize that such designs are to be undertaken at the fixed station licensee's own risk, and future space stations will not be subject to any additional coordination requirements. We limit the protection of such future receivers to the requirement for the space station pfd to meet the limits specified in § 25.208.

[95] Considering the nature of the fixed service deployment in these bands, we believe that the actual number of fixed service receive antennas that will be pointing within 2 degrees of the usable portion of the geostationary-satellite orbit will be quite small, with a correspondingly small impact on fixed-satellite service licensees.

[96] We refer to existing terrestrial fixed services licensed in the 18.3-18.8 GHz band with receivers that point within two degrees of the GSO as "Legacy Systems." All such existing systems must be protected from interference during the applicable period of continued co-primary status, including those operating in the 18.58-18.8 GHz band. Only after the end of the applicable period of continued co-primary status would the protection of Legacy Systems be limited to the 18.3-18.58 GHz band. This means that any satellite system implementations during the applicable

which the FS station is pointed) would be responsible for paying any associated modification costs.[97] We recognize that determining which terrestrial fixed service stations point at the orbit may be difficult, and that, because information may be unreliable, using the currently specified location and relative height of send-and-receive locations may not provide accurate results.[98]

47. We recognize that the development of an accurate Legacy List will be critical to the success of FS/FSS coordination efforts, and that such a list can be developed with reference to a database containing the geographic location and relative height of the FS send and receive antennas. While we recognize that such information is currently available in the Commission's Database, this is the first time we expect the information to be used to establish FS receiver pointing for coordination purposes. Therefore, we provide in this *Report and* Order the opportunity for existing FS licensees in the 18.3-18.8 GHz band to update their location and height parameters and to inform the Commission in such cases where their receive sites in this shared band point within two degrees of the GSO and at which position.[99] This update will not be considered a modification of fixed service facilities, although the compatibility of the "new" location will need to be assessed by interested parties.

48. We are equally concerned about ensuring successful sharing between FSS receiving earth stations and transmitting FS stations. Noting that such earth stations would transmit in the 28/29 GHz band and would need to be coordinated in that band, a common location would, of course, also be used for the reception of GSO/FSS signals in this shared band. This means that the same site must also be available in the downlink band. Such downlink sharing would also have two aspects. In this co-primary band, future FSS receive earth stations would need to ensure that the coordinated location would also not receive interference from transmitting existing FS stations. We expect that the availability of an earth station site at the downlink frequency may place a greater constraint on earth station location than that of the uplink, due to the wide distribution of co-primary fixed links in this band, compared to that of the uplink bands. The chosen location should then be communicated to the Commission to ensure that future terrestrial stations will coordinate their transmitting FS operations. Clearly, the fewer earth stations required, the easier the FSS earth station site selection process will be and the more useable the 18.3-18.58 GHz band will be for the fixed service.[100]

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period of continued co-primary status must coordinate their space stations with Legacy Systems prior to launch, but only to the end of the applicable period of continued co-primary status if they operate in the 18.58-18.8 GHz band.

[97] The need for FS modification will be determined in the space-to-Earth coordination process discussed above.

[98] The Commission has not established requirements for accuracy of transmitting and receiving site information, opening the possibility of inaccurate calculations in some cases.

[99] This information will be compiled by an outside party into a database to be used for both space station and earth coordination purposes and to assist the Commission in any future decision making regarding this band. The Commission will identify that party in a Public Notice issued subsequent to the release of this Order, after consultations with generally established frequency coordination houses. By compiling information in this fashion, we provide an opportunity for independent calculation of pointing direction. If the licensee wishes to modify its license to reflect the corrected information, it should file a separate application.

[100] While we generally expect that, as a result of this rulemaking, satellite operators will use all or part of the 18.3-18.58 GHz spectrum for gateway type earth stations to provide connectivity of their systems to and from the Internet and the Public Switched Telephone Network (PSTN), we do not define and mandate such use because we are aware

49. We believe these actions will provide an equitable approach to sharing because both the terrestrial fixed service and the FSS stations must assume burdens, based upon this *Report and Order,* not presently in the Commission's existing rules: the FSS space stations must coordinate their space stations with those FS stations pointed at their satellites and must accept limitations on the location of their receiving earth stations, a new process. Concomitantly, future terrestrial fixed service stations may point at the orbit only at their own risk, a condition not previously stated and must coordinate with any prior FSS earth stations. Both services collectively assume the responsibility for making this process work, subject to the continuing oversight of the Commission.

50. 18.8-19.3 GHz and 19.3-19.7 GHz Frequency Bands. In the *18 GHz NPRM*, we proposed to designate the 18.8-19.3 GHz band to NGSO/FSS on a primary basis. Teledesic urged us to adopt this proposal and, by doing so, protect the decisions made at WRC-95 and WRC-97 (World Radiocommunication Conferences) to allocate internationally the 18.8-19.3 GHz band to NGSO/FSS.[101] TIA-Fixed Section, on the other hand, requests that we allocate the 19.26-19.3 GHz for terrestrial fixed service use in order to maintain the existing paired channels at 17.7-17.74 GHz,[102] a proposal that was also discussed in the Teledesic Reply.[103] Lockheed contends that we should provide a primary designation of 500 MHz at 18.8-19.3 GHz for NGSO/FSS "to allow for ubiquitous deployment of NGSO FSS user terminals."[104] Teledesic recently entered into the record of this proceeding a detailed statement[105] about the sensitivity of its system to interference from fixed stations operating within the 18.8-19.3 GHz band. Teledesic's statement has implications for both the primary and secondary designation of this band. We discuss secondary designations in the next section of this *Report and Order.*

51. We have fashioned a primary designation solution that resolves the concerns of both the fixed and NGSO/FSS licensees in a balanced fashion, while providing the full requested service designation to the NGSO/FSS. The terrestrial fixed commenters are concerned that they will lose channels at 19.26-19.3 GHz that are paired with 17.7-17.74 GHz. While those channel pairs

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that some GSO/FSS systems would not easily adapt to such a requirement. Because our over-arching objective is to render the band available to both the fixed service and the GSO/FSS service, we will merely require the GSO/FSS to make a judicious effort to find locations where satellite reception is possible in this band. We will monitor implementation and, if it appears that the fixed service is being excessively precluded in the establishment of future links, we will revisit this decision on our own motion. We also note that a request for a declaratory ruling and petition for rulemaking relating to this issue was filed by the FWCC on May 5, 1999.

[101] *See* Teledesic Reply Comments at 9-10 ("The history of the 18.8-19.3 GHz band makes it imperative for the Commission to designate this full band for NGSO FSS use").

[102] *See* TIA-Fixed Section Comments at 3-4.

[103] *See* Teledesic Reply at 10-13.

[104] *See* Lockheed Comments at 7-8. Other commenters submitting band plans also recognized the need to designate 500 MHz to NGSO/FSS on a primary basis. *See* KaStar Comments at 6; Pegasus Comments at 4-6.

[105] *See* Ex Parte Letter from Mark A. Grannis on behalf of Teledesic, to Donald S. Abelson, Chief, International Bureau, FCC dated November 30, 1999, which details Teledesic's concern about this issue and explores the implications of four options in this regard.

will be lost in the adopted redesignation plan, it will happen in a way that should not cause difficulty to the fixed service. We have decided to permit existing fixed stations to continue using those channel pairs subject only to the overriding right of satellite providers to require them to be relocated. In practice, this means that stations in the NGSO/FSS service must accept the interference these stations would present or must pay to relocate the fixed stations to another band. While fixed service licensees are concerned that this may prove difficult, they will not be required to shut down until, under the relocation rules we adopt in this *Report and Order,*[106] a facility providing comparable performance has been coordinated, built and proven to be of equivalent performance.. NGSO/FSS licensees wishing to eliminate FS interference to their earth stations will be fully responsible for relocating the fixed stations. This ensures both that the interference to the NGSO/FSS will not occur and gives the satellite licensees some control over relocation cost.[107] While we note that Teledesic has stated in both their comments and their *ex parte* statement of November 30, 1999 that they are willing to pay to relocate the fixed stations that will cause interference to their earth stations in the 19.26-19.3 GHz band, they have proposed a different compensation method than the one adopted in this *Report and* Order.[108] As both Teledesic and Lockheed point out, the 500 MHz of spectrum at 18.8-19.3 is the only downlink spectrum available for Ka-band NGSO/FSS systems.[109] We take this action because of the unique international status of the 18.8-19.3 GHz band, and because it is fashioned in such a manner to avoid any adverse impact on existing fixed service licensees. We also recognize that NGSO/FSS systems are likely to use the entire 500 MHz of spectrum, as pointed out by Teledesic, currently the only Commission NGSO FSS licensee in this band.[110] Designing equipment to make locally varying adjustments to earth station receiving equipment would be extremely difficult and a costly project, possibly delaying the deployment of NGSO/FSS service in the band and certainly reducing the available service capacity. We conclude that designating the 18.8-19.3 GHz band to NGSO/FSS for primary use best serves the public interest.

52. Therefore, we concur with Teledesic and Lockheed that they will need a full 500 MHz primary designation, and thus, designate the 18.8-19.3 GHz band on a primary basis to NGSO/FSS. We reject the request to maintain a primary allocation to terrestrial fixed service operations in the 19.26-19.3 GHz segment, recognizing that future fixed stations wishing to use these channel pairs must find alternative spectrum. We recognize that this solution does not

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[106] *See* the appropriate section in each rule part of Appendix A, e.g. section 101.91b for the full specification of "comparable facilities." Since these specifications comprise an engineering specification which corresponds to the common English meaning of the word "comparable" meaning the same, they are not discussed further in this text.

[107] Clearly, the location of earth stations in certain areas will have a great associated cost. NGSO/FSS licensees can judge these costs/benefits at the time of acceptance of new subscribers.

[108] *See also* discussion of relocation cost. infra

[109] *See* Lockheed Comments at 8 ("Because there is no alternative downlink spectrum for Ka-band NGSO FSS systems, the Commission should redesignate the 18.8-19.3 GHz band for primary NGSO FSS use"); Teledesic Reply Comments at 10 (arguing that the 18.8-19.3 GHz frequencies "are still the only frequencies in which NGSO FSS need not protect the geostationary arc").

[110] *See* Teledesic Reply Comments at 10 ("There is no practical way for an NGSO FSS system using any reasonable number of downlink carriers to use, for example, the full 500 MHz in rural areas but only a 460 MHz sub-band near an FS station").

directly address the provision of new fixed links that would have used spectrum in the 17.7-17.74 GHz and 19.26-19.3 GHz bands. While not prejudging future Commission action, we note that the development of new channelizations could significantly improve this situation.

53. In the *18 GHz NPRM*, we proposed to retain the designation of a co-primary allocation for terrestrial fixed service and MSS/FL in the 19.3-19.7 GHz band. We tentatively concluded that sharing in this band was feasible due to the limited number of MSS/FL expected to be deployed. Most commenters agreed with our proposal. Pegasus proposed a segmentation of the 19.3-19.7 band that would allocate the 19.3-19.45 GHz segment to MSS/FL and terrestrial fixed service on a co-primary basis, and the 19.45-19.7 GHz band to MSS/FL and GSO/FSS on a co-primary basis.[111] We reject Pegasus' plan to segment the 19.3-19.7 GHz band as an effort to get more spectrum for GSO/FSS users in the 18 GHz band, at the expense of upsetting the overall equity and balance achieved in this *Report and Order*. Motorola argues that this proposal "would create a mixture of GSO/FSS-MSS/FL earth stations in a narrow band segment adjacent to an even narrower segment dedicated to MSS/FL-FS operations."[112]

54. SBC argues that we should not place MSS/FL as a co-primary licensee in the 19.3-19.7 GHz segment[113] because there are serious sharing concerns with such a designation, and proposes that we give terrestrial fixed services primary status in the 19.3-19.7 GHz segment. We reject SBC's request. Instead, we are retaining the designation which was adopted in the *28 GHz Report and Order* and under which, as Motorola points out, the Iridium System was successfully coordinated under Part 25 of the Commission's Rules and operated gateway earth stations in this band in the U.S.[114] We note that given the number of MSS feeder links anticipated in this band, there is little material difference between this shared designation and a primary FS designation. We find no valid support in the record to dismiss our previous tentative conclusion that terrestrial fixed service and MSS/FL should retain their designations in the 19.3-19.7 GHz band. Thus, we conclude the public interest is served by maintaining this designation.

3. Secondary Use

55. In the *18 GHz NPRM*, we proposed to allow secondary use of the entire 18 GHz band by terrestrial fixed services, GSO/FSS, and NGSO/FSS (in bands where the particular service did not enjoy either a primary or co-primary allocation) to provide flexibility throughout the band.[115] We conclude that secondary use of the

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[111] *See* Pegasus Comments at 4-6 (arguing that this segmentation would allow MSS/FL gateways to share the lower portion of the band with terrestrial services and would give GSO/FSS more usable downlink spectrum).

[112] Motorola Reply Comments at 18-19 (arguing that Pegasus' proposed designation provides no benefit to any service and is "counterproductive and inconsistent with the public interest").

[113] SBC Comments at 4-5.

[114] *See* Motorola Reply Comments at 19 (arguing that "SBC's comments appear to be woefully outdated").

[115] *See 18 GHz NPRM* ¶ 33. Under the Commission's Rules, services utilizing spectrum on a secondary basis must not cause harmful interference to primary users to which frequencies are already assigned or to which frequencies may be assigned at a later date. Secondary systems cannot claim protection from harmful interference from stations

18 GHz band is not viable because it would unreasonably inhibit ubiquitous deployment of these services and limit the use of spectrum by primary users of the bands. However, the continued operation of existing fixed stations in primary satellite bands on a non-interference basis would not limit the use of the bands by satellite earth stations; rather it would provide for the continuation of existing services to the public until new satellite earth stations are built. We discuss two different aspects of this issue below: Should we adopt secondary fixed designations and permit continued licensing of stations in bands designated on a primary basis to satellite services? Should we adopt secondary satellite designations in bands designated on a primary basis to the fixed service? We reject a third possibility, proposed by VisionStar.[116] VisionStar proposed the adoption of a temporary secondary allocation for the terrestrial fixed service in bands that are assigned to GSO/FSS systems. They propose that this temporary secondary allocation would be limited to small businesses that would use the spectrum to provide GSO/FSS-like services to consumers through a terrestrial fixed network before 18 GHz GSO/FSS systems are launched and operating. We reject their proposal because we expect it would interfere with the intended application of the fixed service relocation procedure adopted in this *Report and Order.*

56. Regarding secondary fixed operations in primary satellite designations, we conclude that terrestrial fixed services generally should not be designated for secondary use in either primary GSO/FSS or primary NGSO/FSS bands subject to blanket licensing. We find that the continued licensing of these fixed stations, with the exception of indoor low power operations, is incompatible with the ubiquitous placement of earth stations in the primary satellite service, because they may interfere with FSS reception if located close enough to such stations. We would, literally, be encouraging the extension of a condition that we have determined to be incompatible with the ubiquitous distribution of primary satellite services. Regarding the low power fixed systems mentioned in the *NPRM,* in the 18.82-18.87 and 19.16-19.21 GHz bands, such stations have been licensed on a primary basis and will continue to be so licensed, given the proposal in the *NPRM* and the lack of significant comments.[117] They will not be subject to the same transition rules as the full power stations in their band. In addition, they will not be subject to the same relocation requirement, since they will be co-primary with the FSS. They will be permitted to continue to operate, and new stations will be licensed subject only to the limitation that they operate indoors.[118] The restriction to indoor use will, of necessity, place some signal attenuating barrier between low power fixed stations and FSS earth stations, which are always located outdoors. While interference could still be possible, the probability of interference is significantly, and acceptably, reduced as the interfering signal is so diminished. Several commenters urged us to eliminate secondary terrestrial fixed service designations in primary FSS

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of a primary user to which frequencies are already assigned or may be assigned at a later date. Secondary users can claim protection, however, from harmful interference caused by other secondary services to which frequency may be assigned at a later date. *See* 47 C.F.R. §§ 2.104 (d), 2.105(c)(3).

[116] *See* VisionStar Comments at 4.

[117] *See* Section 101.147(r)(10).

[118] *See Section* 101.147 (r)(10) of Appendix A to this *Report and Order.*

bands.[119] TIA-SOUS argued that the "proposal to license FS stations on a secondary basis in satellite spectrum would undercut the Commission's segmentation proposal by reintroducing the cost and delay associated with frequency coordination."[120] TIA-SOUS reasons that a new coordination regime would have to be set up to determine whether new terrestrial fixed service stations could operate under secondary conditions. Lockheed asserts that we should not allow secondary terrestrial operations in the primary FSS band because of interference concerns.[121] We agree with the assessment of TIA-SOUS and Lockheed. With the anticipated deployment of millions of satellite earth stations, we believe that it would be virtually impossible to implement an effective dispute-solving regime to discover terrestrial causes of interference to primary FSS earth stations. The difficulty in identifying the source of interference could have a substantial practical impact on FSS licensees, an impact that they are only responsible to evaluate when they are sharing the band with a primary designated fixed service. For example, attempting to identify the cause of interference and then fixing that problem may take time, causing a significant interruption in service. Such delays would raise operating costs for FSS users and would degrade the reliability of the company's service.[122] We believe such circumstances are avoidable by rejecting our proposal to allow terrestrial fixed service operations to use primary FSS spectrum for secondary use services. The statement of Teledesic referenced above[123] underscores this decision with respect to primary NGSO/FSS service allocations that are blanket licensed, by describing the severe impact that a fixed station of at least 39 dB e.i.r.p. would have on an earth station in this band.

57. We now consider whether the GSO/FSS service can be secondary in primary NGSO/FSS bands. In principle, such designations would only be feasible if the stations of the secondary service could be designed to operate without impact on the primary service. This result could be achieved if the NGSO receiver avoided pointing at the Geostationary Orbit. However, because the 18.8-19.3 and 28.6-29.1 GHz primary NGSO designations are the only bands that do not restrict NGSO systems from pointing at the orbit, this fact greatly increases the capacity of satellites in this band, since fewer satellites will be required if a larger part of the sky

[119] *See, e.g.*, Lockheed Comments at 8-9 ("Lockheed Martin does not support the secondary FS use of spectrum designated for FSS use on a primary basis"); Loral Comments at 7-8 ("Loral does not believe that the Commission's proposal to allow secondary operations on a non-interference basis by both terrestrial fixed service and FSS is feasible"); TIA-SOUS at 3-4 ("The Commission should not permit secondary FS operations in FSS bands"); Hughes Reply Comments at 13 (arguing that "there is no reason to allow secondary terrestrial uses of the FSS primary bands").

[120] TIA-SOUS Comments at 3; *see also* Teledesic Reply Comments at 12-13 (arguing that secondary allocations to terrestrial fixed services in FSS primary bands would result in increased costs and delayed deployment of satellite service without providing corresponding benefits to terrestrial fixed service).

[121] *See* Lockheed Comments at 8 (stating that because terrestrial fixed service operations transmit, and FSS earth stations only receive in the 18 GHz band, secondary terrestrial fixed services transmitting in an FSS primary band can cause significant interference to a receiving FSS earth station).

[122] *See* TIA-SOUS Comments at 3-4. (noting that possible delays caused by secondary terrestrial licensees would not be tolerated by prospective customers); Teledesic Reply Comments at 13 (arguing that secondary terrestrial use would cause increased costs and an undesired quality of service).

[123] *See* Ex Parte letter from Mark A. Grannis on behalf of Teledesic, to Donald S. Abelson, Chief, International Bureau, FCC, dated November 30, 1999, also cited above.

is available for service. To avoid pointing at the orbit would require more satellites to achieve the same system capacity, increasing the cost of providing NGSO/FSS services at the same level. It would be a great constraint on the NGSO service to require such orbit avoidance, and would appear to be unwarranted to avoid interference from a secondary service. We, therefore, do not designate a secondary GSO/FSS service in the downlink NGSO band.

58. Finally, we consider whether the FSS service can be permitted to operate on a secondary basis in terrestrial fixed service primary bands, as we proposed in our *NPRM*. Under such primary/secondary sharing scenarios, primary operations must be able to determine which station is causing harmful interference, should such interference result from any secondary operation. Secondary FSS operations would have to protect new primary terrestrial fixed satellite users. As a result, terrestrial fixed users face raised costs through either coordination with secondary users before beginning service or delays in service while trying to find causes of interference. Furthermore, under such a scenario, the FSS user would be at the mercy of new terrestrial links that may cause significant interference, which they must accept, and disruption of service. Based on these considerations, we reject the proposal to allow secondary FSS service in bands designated for primary use by terrestrial fixed service.

4. Conclusions Regarding the Band Plan

59. We believe the band plan adopted herein generally meets the spectrum needs of the respective services designated to operate in the 18 GHz band. We note that, like our *NPRM* proposal, the band plan we adopt herein provides GSO/FSS with 1000 MHz of spectrum, 720 MHz of which is primary and 280 MHz of which is co-primary. Several satellite commenters desire to obtain a minimum of 1000 MHz of unshared downlink spectrum in the Ka-band. These commenters seem to base their arguments, in part, on the fact that we designated 1000 MHz of uplink spectrum to GSO/FSS in the *28 GHz First Report and Order*. The *28 GHz First Report and Order*, however, designated 750 MHz of primary uplink spectrum for GSO/FSS systems, and 250 MHz of co-primary uplink spectrum shared with NGSO/FSS systems. We are adopting a similar approach in the downlink band. We generally designate equal amounts of spectrum to GSO/FSS, taking into account systems for uplink and downlink use, and this *Report and Order* provides just that, when considering both primary and co-primary spectrum.

60. We adopt this Band Plan acknowledging that many existing terrestrial fixed services operating in parts of the 18 GHz band that currently serve the public will be forced to relocate their facilities to serve these customers. As previously discussed, terrestrial fixed operators are losing use of 720 MHz of previously usable spectrum due to this designation. Furthermore, the 500 MHz we designate for NGSO/FSS services represents the only block of downlink spectrum in which these services can currently operate. Moreover, satellite commenters failed to demonstrate how existing consumer demand would justify the designation of 1000 MHz of spectrum for exclusive primary use by them. We conclude that the 500 MHz of downlink spectrum (280 MHz co-primary at 18.3-18.58 and 220 MHz primary at 18.58-18.8) in conjunction with the 500 MHz of downlink spectrum at 19.7-20.2 GHz designated to GSO/FSS satisfies the near-term spectrum requirements of GSO/FSS. We also conclude that the 500 MHz primary spectrum designated to NGSO/FSS at 18.8-19.3 GHz and the 400 MHz of co-primary spectrum at 19.3-19.7 GHz to MSS/FL meets the spectrum requirements of the respective services.